

groundwater regime. Any accidental spills at off-site locations may be the source of the elevated chemical presence observed at OW654 and OW655. The source of the elevated chemical presence at OW654 is complicated because NAPL is present in addition to dissolved chemicals in the groundwater. Since NAPL moves under different migration criteria than APL, the NAPL presence must be evaluated separately. The following Section 7.4 discusses the NAPL presence at OW654.

The OSI program has shown that the western extent of elevated chemical presence is limited to the area within close proximity of the western Plant boundary. Wells OW649D, OW649C, OW650, OW651D and OW651C on the western side of the Site, all exhibited only minor chemical presence with the total organic SSI concentrations all being less than 600 µg/L; i.e. 44/23, 130/280, 34/11, 230/280 and 560/120 µg/L (Round 1/Round 2) respectively. This is consistent with the total organic SSI concentrations measured at OW403 which exhibited similar low level chemical presence.

The trace of NAPL staining on the bedrock core collected from well OW650 on the west side of the NYPA conduits is inconsistent with the groundwater quality measured at the well. Only low chemical concentrations are present in the groundwater at this location.

To the north, the increase in chemical concentrations along Royal Avenue has already been discussed. The chemical concentrations measured at OW651, OW652 and OW653 demonstrate that a significant APL chemical concentration reduction occurs within close proximity to the northern plant boundary.

The analytical results from OW656 which is located on the north side of Royal Avenue show that the chemical concentrations reduce beyond the groundwater divide created by the Falls Street Tunnel. The chemical concentrations measured in groundwater at OW656 are not from the Buffalo Avenue Plant.

Chemical presence measured in deeper bedrock units is generally consistent with the overlying unit and/or upgradient areas. Elevated chemical presence was not observed in the deeper wells at any of the well nests where it was not already present in either the overlying unit or at an upgradient location.

7.4 OW654D-NAPL

NAPL is present in well OW654D. There is no known NAPL source located in the immediate area of OW654D, therefore, it is assumed that the NAPL has migrated to the location. The potential for NAPL to have migrated from OxyChem's Buffalo Avenue Plant has been evaluated and it has been determined that the OW654D NAPL has not migrated from the Plant.

Based upon a review of the overburden stratigraphy and chemical information in the area between the OxyChem Plant and OW654D, it is confirmed that the NAPL has not migrated to the area of OW654 from the Plant through the overburden. NAPL was not present in any of the OSI

overburden wells located immediately north of the northern plant boundary except for the trace of NAPL present at OW554.

The potential for NAPL to migrate northwards from the Plant via the bedrock is limited. As shown on Figure 5.3.1, the bedrock surface slopes southwards back toward the Buffalo Avenue Plant. In addition, the bedding planes in the bedrock, which provide the primary pathways for APL and NAPL migration, also dip to the south at a rate of approximately 15 feet per mile. Consequently, the primary overall direction of NAPL migration in the bedrock beneath the Buffalo Avenue Plant is to the south. Fractures other than the bedding planes in the bedrock can exist and some of these may result in some northerly flow of NAPL, however, it is not reasonable to expect migration on the order of 1,500 feet north to occur without intersecting the southerly dipping bedding planes. Intersection with any of the bedding planes would be expected to result in southerly NAPL migration.

The chemical concentrations measured at the first line of wells located approximately 1,000 feet north of the Plant boundary (OW651, OW652 and OW653) all show relatively low level chemical presence when compared with wells along the Plant boundary. The concentrations of the wells on the first line are not at high enough concentrations to be indicative of NAPL presence. As a result, NAPL is not anticipated to have migrated to the area of the first line of wells 1,000 feet north of the Plant boundary. This is particularly true at OW654 since OW652 is located 500 feet immediately south and in line with the direction back toward the Buffalo Avenue Plant and

therefore is the most likely well to have encountered NAPL on its way to OW654. Well OW652 exhibits no characteristics of NAPL presence.

One potential path of NAPL migration to OW654D from the Buffalo Avenue Plant was identified as the Iroquois Street Sanitary Sewer. It runs from Buffalo Avenue to Royal Avenue and passes 50 feet west of OW654D. However, the evaluation of this sewer has determined that NAPL does not flow northwards to OW654D through the Iroquois Street Sanitary Sewer or its bedding. NAPL was not present at OSI well OW652 which is located 29 feet east of the Iroquois Street Sanitary Sewer and upstream of OW654D. Not only is OW654D further away from the sewer, it is 500 feet further down the sewer which makes it even further from the Buffalo Avenue Plant if it were the source. Also, as discussed in the SDCP Report and the report entitled "Underground Works Investigation, Installation Summary", June 28, 1989, NAPL was not present at BH10-88 which was installed to check for NAPL presence in the Iroquois Street Sanitary Sewer bedding. BH10-88 is located in the northwest corner of the Plant, within the Plant boundaries. Since NAPL did not enter the bedding prior to the sewer leaving the Plant boundary, it is unlikely to have done so at a remote location further north of the Plant boundary in an updip location in the bedrock.

As a further segment of the evaluation, the elevation of the NAPL in the area has also been reviewed. The elevation of NAPL in OW654D is approximately 544.0 feet (OCC datum). NAPL has also been observed at other D-zone wells during the SDCP. The elevation of the NAPL is approximately 505 feet and 512 feet (OCC datum) at OW405D and OW409D,

respectively. These elevations show the NAPL located at OW654D would be moving south towards OW405D and OW409D, not north toward OW654D.

The elevation of the top of the NAPL presence at OW654D is approximately 26 feet below the ground surface. This elevation is consistent with the elevation of the invert of the Iroquois Street Sanitary Sewer which could be acting as a line sink for NAPL collection through this area.

There is a potential that the NAPL has migrated to the area of OW654D from the north. NAPL has been shown to be present at three of the wells north of OW654D. Two of the wells monitor the overburden while the third monitors the upper bedrock zone. The presence of NAPL northeast of OW654 is anticipated to be a likely candidate for NAPL migration into the OW654 area. This is particularly true due to the southerly dip of the bedrock fracture planes. The Falls Street Tunnel and the Southside Interceptor Sewer slope westward through this area and may provide a southwesterly migration route for any NAPL present in the bedrock north and east of OW654 along Royal Avenue.

8.0 CONCLUSIONS

Based upon the data collected during the OSI, the following conclusions have been formulated:

- Significant chemical migration through the overburden regime to off-site areas adjacent to the Plant has not occurred. Two areas near wells OW554 and OW559 exhibit some chemical presence which is elevated although the concentrations are substantially reduced when compared to adjacent on-site Plant boundary wells.
- Elevated chemical concentrations are not present in the bedrock groundwater flow regime to the west of the Plant or along a line of wells located 1,000 feet north of the Plant. This includes observations made in each of the waterbearing zones investigated at depth in the bedrock flow regime.
- Elevated chemical concentrations in the bedrock groundwater flow regime were present at locations 1,500 feet north of the Plant. This elevated chemical presence is not believed to be associated with migration from the Plant. The installation of additional wells to further substantiate this belief have been unsuccessful due to access limitations.
- The proposed Corrective Measure designed to provide hydraulic containment of the APL plume along the northwestern and western Plant boundaries is consistent with the analytical results obtained during the

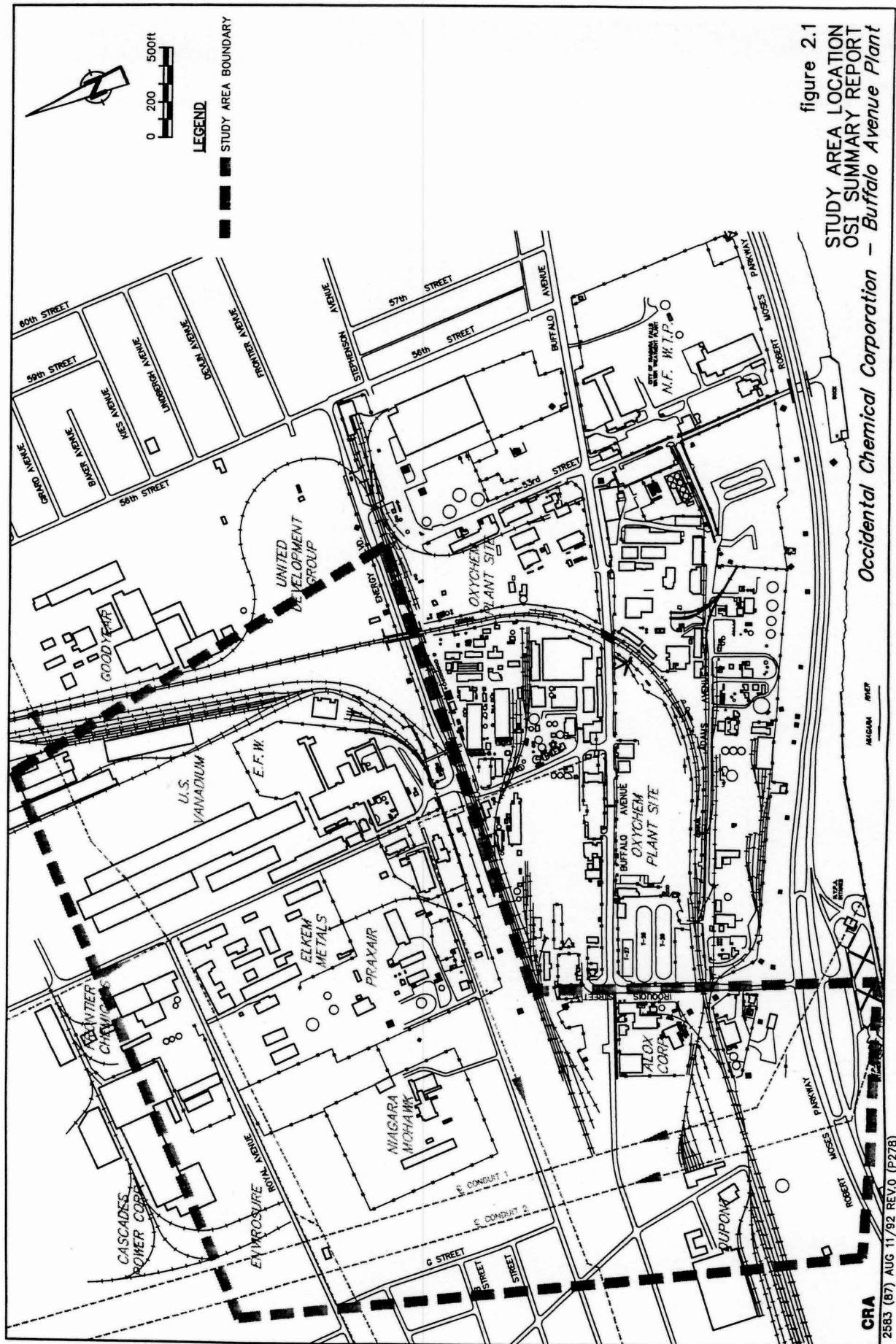
OSI which shows no elevated chemical presence attributable to the Buffalo Avenue Plant extending substantial distances from the Plant boundary.

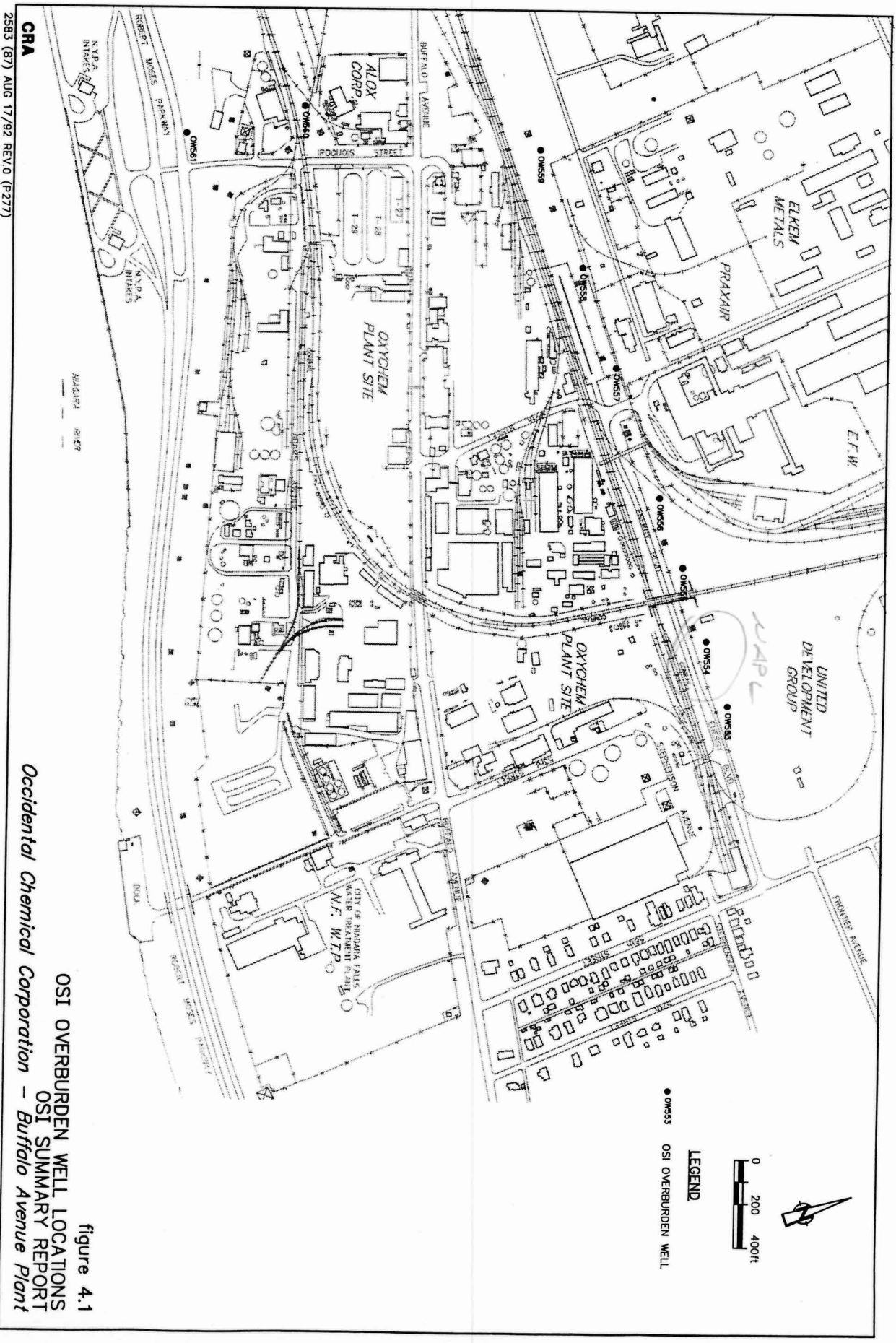
- The OSI has shown that the NAPL present at OW654D has not migrated from the Buffalo Avenue Plant. Evaluation of the APL chemistry has shown that the concentrations of SSI parameters decreases with distance north of the Plant boundary and are not high enough to be indicative of NAPL presence. NAPL migration along the bedrock in a northerly direction is unlikely as the bedrock surface slopes southerly. NAPL migration along the northward sloping Iroquois Street Sanitary Sewer is unlikely as OW652, which is located closer to the sewer than well OW654, and upstream of OW654 does not have NAPL present. Similarly, BH10-88 installed in the bedding of the Iroquois Street Sanitary sewer at the northern Plant boundary does not have NAPL present.

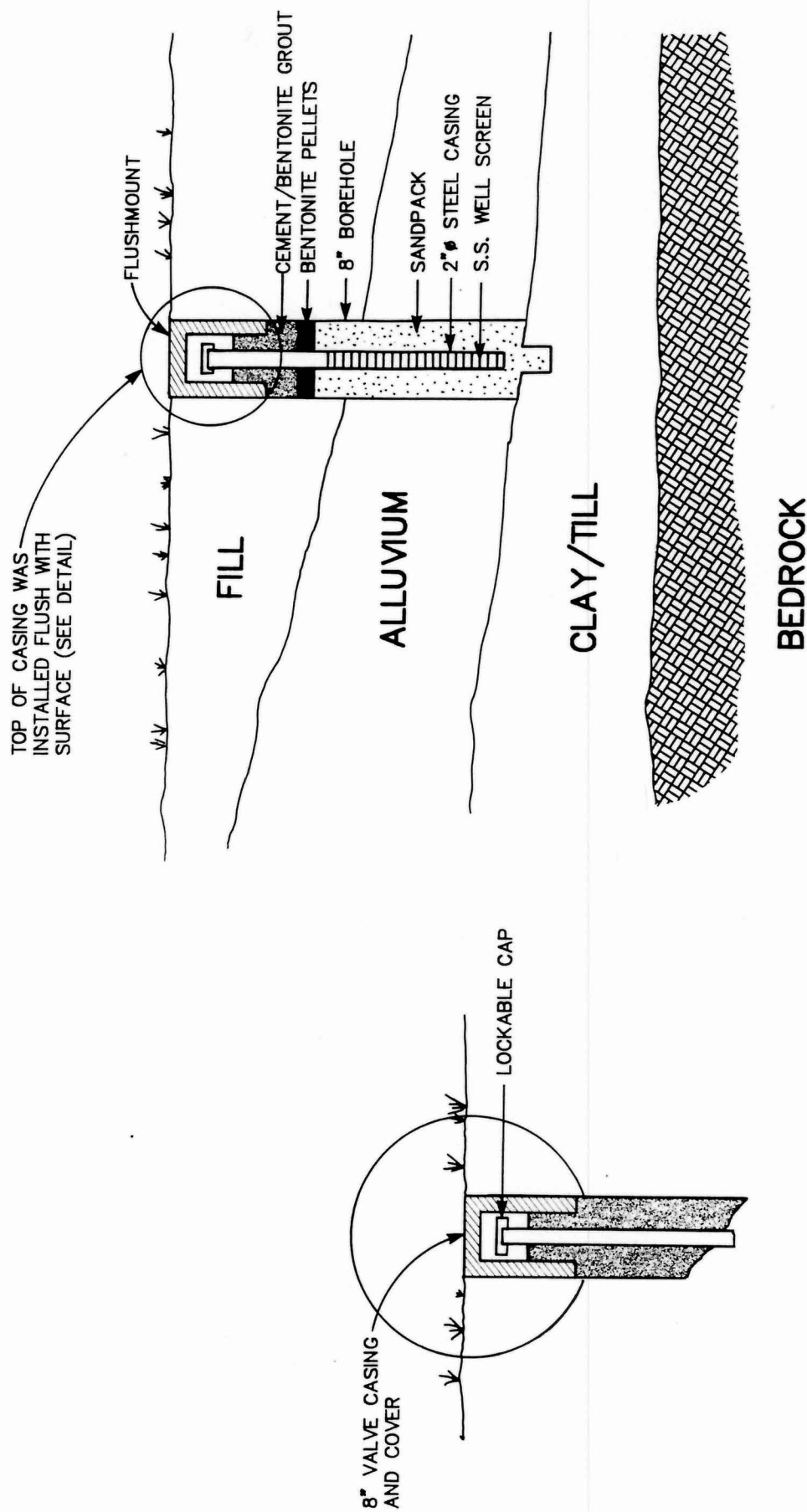
OxyChem still plans to install bedding wells along the Iroquois Street Sanitary Sewer to confirm that the sewer bedding does not act as a NAPL migration route. These wells will be installed as soon as access from Niagara Mohawk Power Corp. is obtained. The results of this investigation will be reported as an Addendum to this Report.

- The Energy Boulevard Drain Tile System acts as a line sink to the overburden groundwater flow in the area of the system and prevents any further northward migration of overburden groundwater chemistry past the north Plant boundary of that area.

- The OSI program has shown that the NYPA drains act as a line sink for bedrock groundwater flow in the area to the west of the off-site area. Similarly the Falls Street Tunnel and the Southside Interceptor Sewer act as line sinks for shallow bedrock groundwater in the north part of the off-site area. These structures act as boundaries to further northerly or westerly flow of bedrock groundwater from the Plant.
- The OSI has shown that the elevated chemical concentrations in the bedrock groundwater in the area of Royal Avenue is not due to a groundwater chemical plume extending from the Buffalo Avenue Plant.
- The OSI is as complete as possible and has shown the data and conditions to be consistent with the results of the Regional Groundwater Assessment which notes that flow from the Buffalo Avenue Plant should be in a north westerly direction and that elevated chemical presence in the bedrock groundwater flow regime is generally limited to the immediate area of the source.







NOTE: DRY JOINT ASSEMBLY

figure 4.2
TYPICAL INSTALLATION DETAIL FOR
OVERBURDEN MONITORING WELL
OSI SUMMARY REPORT

Occidental Chemical Corporation—Buffalo Avenue Plant

655D
NAPL
Phase II

